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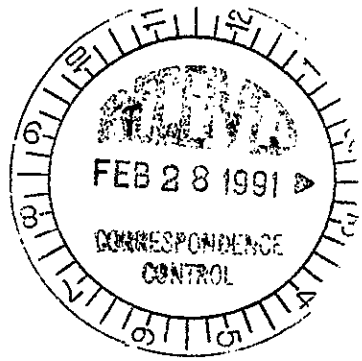
EPA

February 21, 1991




Larry Goldstein
CERCLA Unit Manager
Washington State Department of Ecology
Hanford Projects, PV-11
Olympia, Washington 98504

Re: EPA Comments on 100-NR-1 and 100-NR-3 RFI/CMS Work Plans

Dear Mr. Goldstein:

Enclosed are the U.S. Environmental Protection Agency's (EPA) comments on the September 1990 (Draft A) RCRA Facility Investigation/Corrective Measures Study Work Plans for the 100-NR-1 and 100-NR-3 Operable Units, Hanford Site, Richland, Washington.

As the support agency for these units, we have not been able to review the entire document in depth. However, we have concentrated on areas of primary concern to the EPA. We hope these comments will be useful in your submittal to the Department of Energy. A WordPerfect, Version 5.0 diskette is included with the hard copy.

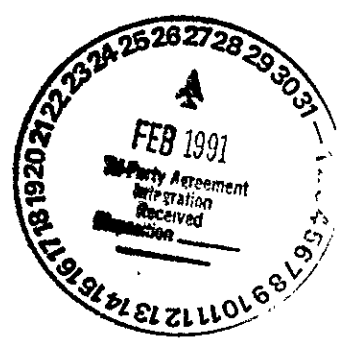
If you have any questions, please contact me at (509) 376-5466.

Sincerely,

Pamela S. Innis
Unit Manager

Enclosure

cc: G. Hofer, EPA
D. Lacombe, PRC
L. Powers, WHC
W. Staubitz, USGS
Administrative Record (100-NR-1 and 100-NR-3)



HANFORD SITE 100-NR-1 OPERABLE UNIT
RICHLAND, WASHINGTON
TECHNICAL REVIEW OF RFI/CMS WORK PLAN

## GENERAL COMMENTS

The work plan and the field sampling plan do not adequately address and characterize the sources and the vadose zone for the extent of contamination. For example, no soil analyses were previously conducted for facilities in the 1314-N liquid waste loading facility grouping, the 166-N tank farm grouping, the 119-N air sampling and monitoring building, the 1310-N radioactive chemical waste storage facility grouping, or the burning pit groups (Section 3.1.2.1.1). The proposed minimum number of surface and near-surface soil samples for each applicable unit are insufficient to verify the existence of contamination due to the possible migration of contaminants.

Few data are available for vadose zone characterization. Data were collected for soils from some monitoring well borings (Section 3.1.2.1.1.2). In the field sampling plan, no subsurface soil samples are proposed in the vadose zone except those taken during drilling of groundwater monitoring wells. The data obtained from the proposed field sampling plan may not adequately characterize sources, determine the extent of vadose zone contamination, or meet the requirements of the baseline risk assessment.

## SPECIFIC COMMENTS

1. Deficiency: Section 1.2, p. WP-4

The text misleadingly states that

> The purpose of this RFI/CMS work plan is to define specific strategies, procedures, and activities required for successful completion of the RFI/CMS at 100-NR-1. This entails identification and evaluation of all known operational and environmental information and development of plans for the collection of additional data necessary to adequately characterize the nature, extent, and rate of migration of contamination at the site . . .

However, the field sampling plan includes only source sampling that ". . . will be conducted to determine the existence and concentration of contaminants." (p. SAP/FSP-8) No sampling to determine the extent of contamination is included in the work plan other than that of the soil gas survey. Only in Section 1.3.2 (p. WP-9) is it explained that "scoping studies and work plans are focused on the RFI Phase I, which consists of the initial characterization of the site."

Recommendation:

The scope and objectives of the work plan should be presented clearly. The objectives and activities of each phase should be described.

2. Deficiency/Recommendation: Section 3.1.2.2.3, Table 25, p. WP-194

The well identifications are not included for the samples having concentrations exceeding drinking water standards for each constituent. The wells from which constituents were detected above drinking water standards should be specified to identify the proximity of sources or unplanned releases contaminating groundwater.

3. Deficiency/Recommendation: Figure 11, p. WP-36

Does the scale (in feet) shown on the middle section also apply to the other two sections? Clarify.

4. Deficiency/Recommendation: Section 2.2.2.2.1, p. WP-39

The location of the cross sections shown on Plates A and B are not plotted. We could not find BH-1 or K-10 (which were used in the construction of these cross sections) on any of the figures in the work plan. Provide a figure showing the location of the cross sections and include the wells and boreholes used to construct the section.

5. Deficiency/Recommendation: Figure 16, p. WP-45

Where is the Hanford-Ringold contact in wells N-57 and N-67? It is not clear as drawn. Redraw.

6. Deficiency/Recommendation: Section 2.2.2.2.4, p. WP-47

The second paragraph contains a discussion of the relationship between natural gamma logs and silt layers in the Hanford Formation and attributes the information to Prater et.al. (1984). While this reference does have a section on the 1325-N Crib area, we could not find the particular information indicated. The wells referred to (N-36 to N-45) were drilled in April 1984, while the Prater report deals with the 1983 calendar year. Check references and clarify.

7. Deficiency/Recommendation: Table 2, pp. WP-52 and WP-53

Four wells (N-7, N-SV, N-22, and 6-86-60) have "completion depths" that are greater than "drilled depths". Correct depth information as appropriate for each well.

8. Deficiency/Recommendation: Table 2, pp. WP-52 and WP-53

Include summaries for the "BH" wells (see figure 13).

9. Deficiency/Recommendation: Section 2.2.3.2.2, p. WP-55

The last sentence of the section states tht "These data...will be published in the fall of 1990." Update this statement. Have the data been published? Name of publication?

10. Deficiency/Recommendation: Figure 22, p. WP-60

The water level given for well N-50 is at least ten feet lower in altitude than would seem logical based on the other data. Is this a typo? Is there some explanation for this low level if it is real? Clarify.

11. Deficiency/Recommendation: Figure 22, p. WP-60

The contours, as drawn, do not conform to the data for well N-53. Redraw contours or explain lack of conformity.

12. Deficiency/Recommendation: Section 2.2.3.2.4, p. WP-61

The last paragraph states that discharge to 116-N-3 Crib and Trench was scheduled to be discontinued in December 1990. Update this information.

13. Deficiency/Recommendation: Figure 23, p. WP-62

The contours, as drawn, do not conform to the data for wells N-8, N-20, N-21, N-52, N-54, N-55, and N-61. Redraw contours or explain lack of conformity.

14. Deficiency/Recommendation: Figure 24, p. WP-63

The contours, as drawn, do not conform to the data for wells N-8, N-20, N-22, N-26, N-39, N-40, N-41, N-42, N-51, N-59, and N-69. Redraw contours or explain lack of conformity.

15. Deficiency: Section 3.1, p. WP-77

Some discussion is needed regarding the assumed completeness/accuracy of the information in this section. It is apparent that the reporting of "spills" has changed with time. Presumably, relatively large "spills" could have occurred and gone unreported and undocumented in the early years of operations at 100-N. It will mislead our investigation if we accept the information in this section as representing the only possible contaminated sites.

Recommendation:

Add some discussion of completeness/accuracy of contamination information.

16. Deficiency: Tables 15, 16, 17, and 18, pp. WP-177 through WP-180

The significant figures of the summary statistics in these tables are carried far beyond the accuracy and precision of the original analyses.

Recommendation:

The summary statistics should be carried to only three significant figures.

17. Deficiency/Recommendation: Section 3.1.2.2.1, p. WP-185

The use of "...general quality of groundwater at the Hanford Site..." as background groundwater quality may not be appropriate for the 100-N Area. With the probability that some parts of the groundwater system in the 100-N Area receive significant inflow from the Columbia River, background (in at least some instances) may more closely resemble the river.

18. Deficiency/Recommendation: Section 3.1.2.2.3.1, p. WP-196 and Table 26, p. WP-195

The second paragraph on page WP-196 states that well N-67 had the maximum measured gross beta activity in the 100-N Area. In table 26, N-67 is not listed as exceeding the beta activity standard. Does this mean that N-67 was not sampled in July/August 1989, or is there a typo in the table (should N-37 be N-67)?

19. Deficiency/Recommendation: Figure 71, p. WP-210

The contours do not conform to the data for well N-67. If N-67 has not been used for drawing the contours (e.g., different stratum than other wells), then so indicate in explanation.

20. Deficiency/Recommendation: Figure 72, p. WP-211

The contours do not conform to the data for wells N-14, N-29, N-39, N-67, and N-70. Redraw contours or explain lack of conformity.

21. Deficiency/Recommendation: Figure 73, WP-212

See comment on Figure 71, p. WP-210.

22. Deficiency/Recommendation: Figure 74, p. WP-214

The contours do not conform to the data for wells N-24 and N-70. Redraw the contours or explain the lack of conformity.

23. Deficiency/Recommendation: Figure 75, p. WP-215

The contours do not conform to the data for well N-66. Redraw the contours or explain the lack of conformity.

24. Deficiency/Recommendation: Figure 75, p. WP-215

Well N-40 is on the map, but no value is shown. Add value or remove well symbol and number.

25. Deficiency/Recommendation: Figure 76, p. WP-216

The contours do not conform to the data for wells N-4, N-14, and N-32. Redraw the contours or explain the lack of conformity.

26. Deficiency/Recommendation: Figure 77, p. WP-224

The contours do not conform to the data for well N-21. Redraw the contours or explain the lack of conformity.

27. Deficiency/Recommendation: Figures 79, 80, 81, and 82, pp. WP-235 and WP-236

These figures would be more clearly presented by adding the wording "via groundwater to the Columbia River" between "Releases" and "of".

28. Deficiency/Recommendation: Section 3.3.1.1, p. WP-272, first paragraph

The reference "1986b" appears incorrect and should be changed to "1989b."

29. Deficiency: Section 3.3.2.1, p. WP-272, first paragraph

The text states that "those parameters that are known to be both highly elevated above background levels and commonly found (present in at least 10% of the samples) . . . are also included as target contaminants." However, a reference for using the 10 percent value is not provided. EPA guidance states that chemicals positively detected in at least one Contract Laboratory Program (CLP) sample should be included in the risk assessment (U.S. EPA, 1989). In addition, the text states, "this means that several contaminants reported at very low concentrations are not included."

Recommendation:

The rationale and its reference should be provided for including chemicals found in 10 percent of the samples, instead of all chemicals found in one CLP sample. These contaminants should be included in the risk assessment.

30. Deficiency: Section 3.3.2.1, p. WP-274, second paragraph

The text discusses the use of corrective action requirements and critical toxicity values. In particular, when a corrective action requirement is not available, a critical toxicity value is determined. However, corrective action requirements are not part of the risk assessment process but are part of the corrective measures study process

and should be kept separate from the baseline risk assessment (Sweeney, C., EPA, 1990).

Recommendation:

A contaminant for which a corrective action requirement has been established should not be eliminated. It should first be determined whether a reference dose is available for the contaminant or whether a critical toxicity value is to be calculated. Some contaminants may be screened out at this point (for example, certain essential nutrients under specific circumstances). Other contaminants may be carried through the risk assessment at one-half the detection limit (for example, contaminants that present a $10^{-6}$ risk at their detection limits). Questions regarding specific contaminants should be directed to the risk assessment team, technical support branch, Environmental Services Division, EPA Region 10.

31. Deficiency/Recommendation: Section 3.3.2.1, p. WP-274, third paragraph

The text states that "the nonradioactive metals in the table are limited to those which have been detected at concentrations above drinking water standards." Drinking water standards should not be used to screen out contaminants in the preliminary toxicity assessment. Table 52 should include all contaminants detected above background or known to be present on the site based on historical information.

32. Deficiency/Recommendation: Section 3.3.2.1, Table 52, p. WP-275

Table 52 is limited to groundwater data. Table 52 should include all media (that is, water, soil, and air). Although sediments and soil are not readily accessible or mobile at this time, they may be accessible or mobile in the future.

33. Deficiency/Recommendation: Section 3.3.3, p. WP-277, second paragraph

The text refers to the natural and bomb-test fallout-derived dose without providing a specific value or reference. The natural and bomb-test fallout-derived dose and reference should be included.

34. Deficiency/Recommendation: Section 4.2.2, Table 56, p. WP-294

Collection of lysimeter data for the vadose zone is listed in the data types column. There is no mention of installation of lysimeters or data collection for the vadose zone in the field sampling plan. It should be stated whether lysimeters will be installed to refine the concept of unsaturated flow and recharge in the vadose zone, as specified in the table.

Radiological properties should be included for surface water/sediment in the data types column.

35. Deficiency/Recommendation: Section 4.2.3, Table 58, p. WP-298

The acronym MOSA should be defined. The field parameters for groundwater should be included. The use of data for the source sample should be described. The acronyms for OHP and EII are incorrectly listed in the key.

36. Deficiency/Recommendation: Section 4.3.3.4, p. WP-314

To accurately determine the extent of vadose zone contamination, additional sampling may be required. This should include, but is not limited to the installation of lysimeters.

37. Deficiency: Section 5.3.2.2.1.1, p. WP-330 and Section 2.1.1.1, p. SAP/FSP-4

The contour interval of the base map is described as being two feet. It should be noted that this base map will be digitized and entered into HEIS and that the contour interval and coordinate system should be compatible with HEIS. We are unclear as to whether the 100-N grid noted in this section reflects a new grid developed for this investigation or whether it represents an old grid.

Recommendation:

The contour interval of the topographic map should be 0.5 meter and the grid should be in Washington State Lambert metric coordinates. The coordinate system of the grid should be compatible with the HEIS database management system (for future GIS applications).

38. Deficiency/Recommendation: Section 5.3.2.4, Table 63, p. WP-340

The values for MDC and MDL for the contaminants of concern should be specified in the table, with references provided.

Trichloroethylene should be included under the analysis of interest column for volatile organics.

The unit for volatile organic compounds and pesticides/PCBs in soil is incorrectly given as $\mu$g/L and should be changed to $\mu$g/kg.

39. Deficiency: Figure 89, p. WP-354

Wells N-D-A1 and N-19-Au are intended to test whether contamination from 116-N-1 and 116-N-3 move to the river. The first (most upriver) proposed spring sampling site is over 2000 feet downriver from these wells. If contamination is suspected through the area of these wells to the river, then there should be proposed spring sampling sites in the same area.

Recommendation:

Place additional spring sampling sites upriver to include the river shore area in the vicinity of well N-D-A1 and N-19-Au.

40. Deficiency: Section 5.3.4.2.3, p. WP-355

The flow from the springs and seeps to the river probably represents a mixture of bank storage and groundwater flow. The ratio of bank storage to groundwater flow continually decreases with time (after decline in river stage), and the water quality should reflect this changing ratio. In order to accurately assess contamination movement to the river, we have to track the trend in water quality at the springs and seeps. Tracking of the water quality trend can probably be accomplished by measuring several indicator parameters (e.g., specific conductance, temperature) at regular intervals during the entire period from the initial decline of river stage to final sampling.

Recommendation:

Add quality trend identification to the sampling procedure.

41. Deficiency/Recommendation: Section 5.3.5, p. WP-358

The vadose zone sampling program is inadequate to evaluate the potential transport of contaminants underlying the 116-N-1 and 116-N-3 Cribs and Trenches. Over 10,000 curies of radionuclides and tens of thousands of pounds of chromium were discharged to these facilities and it is likely that a large amount of these contaminants remains in the sediments underlying these sites. However, no sampling of sediments underlying these facilities has been done in the past (based on the information presented in this work plan) and none is proposed for the 100-NR-1 RFI.

As noted on p. WP-358, sampling and analysis of the vadose zone materials will be conducted in conjunction with source sampling activities and monitoring well installation. However, no source sampling is proposed for 116-N-1 and 116-N-3 facilities nor are any new monitoring wells proposed to be located near the 116-N-3 faiclity and only one well is proposed to be adjacent to the 116-N-1 facility. Further, on the basis of data from wells number 1, 2, and 3, installed near the 116-N-1 facility, "lateral migration of contaminants from the trench within the unsaturated zone is not apparent" (WP-174), so analyses of soil samples from nearby borings would not be useful to characterize sediments directly below the faiclity. We, therefore, recommend that borings be installed directly through the cribs and trenches (as proposed in other operable unit RI/FS and RFI/CMS work plans) to determine distribution of what is likely to be the largest amount of existing contamination within the operable unit.

We further recommend that the physical and hydraulic properties of the sediments underlying these facilities be evaluated. The large volume of waste discharged (billions of gallons) to 116-N-1 and 116-N-3 and the

strong acid and base discharged to 120-N-1 likely resulted in signficant physical and chemical changes within the underlying vadose zone sediments. Soil samples collected from wells installed in nearby areas unaffected by these waste discharges may have significantly different hydraulic properties, and applying the results of physical analyses of these samples to potentially altered sediments underlying the waste facilities (as proposed in the work plan) may provide grossly misleading results and is therefore unacceptable.

42. Deficiency/Recommendation: Section 5.3.6, p. WP-363, third paragraph

The first sentence in the paragraph appears to be scrambled.

43. Deficiency: Figure 91, p. WP-365

The Au wells are shown to straddle the Hanford-Ringold contact. It is quite likely that the hydraulic properties of these two units may differ significantly. We will need good estimates of hydraulic parameters for each unit indepently in order to properly analyze and model the groundwater flow system. Wells which are open to both units will not yield usable values from aquifer tests (unless the individual units can be successfully "packed off" during aquifer testing).

Recommendation:

Some of the shallow (Au) wells should be open only to the Hanford and some only to the Ringold.

44. Deficiency/Recommendation: Section 5.3.6, p. WP-369

In the paragraph on well N-B-B, third line, should "...confining layer B..." read "...confined aquifer B..."?

45. Deficiency: Section 5.3.6, p. WP-371

The paragraph on well N-L-Au states that no chemical analyses are proposed for aquifer or vadose sediments. How will the extent of previous mounding be tested without these analyses?

Recommendation:

Add chemical analyses of sediments from this well to the sampling plan.

46. Deficiency/Recommendation: Section 5.3.6.2.2.3, p. WP-376

Moisture content can greatly influence the Munsel Color identification. Samples either should be all at the same moisture condition, or the moisture condition should be recorded when making the Munsel identification. Indicate procedure to be used.

47. Deficiency/Recommendation: Section 5.3.6.2.2.3, p. WP-376

Recently, there has been significant discussion regarding the best application of borehole geophysical techniques on the Hanford Site (see EPA letter to DOE regarding borehole geophysics for the 200-BP-1 unit. This document should be consulted before making final plans for borehole geophysical work.

48. Deficiency: Section 5.3.6.2.2.5, p. WP-377

The work plan states that "stage 2 development" of wells will start (at the earliest) 24 hours after installation of annular seals. Is 24 hours sufficient time for the seals to set?

Recommendation:

Provide information to establish that 24 hours is sufficient time for setting of the seals, or increase time as appropriate.

49. Deficiency: Section 5.3.6.2.4, p. WP-377

It is not clear as to when slug tests will be performed; after sand packing, after final development and seal installation? If slug tests are performed in wells with sand packs in aquifers with hydraulic conductivities that are greater than the sand packs, then the only hydraulic parameters we are likely to be able to measure will be those of the sand pack.

Recommendation:

If possible, slug tests should be conducted before placement of the sand packs. Possibly with temporary screens (or even open holes/open ended wells) before development?

50. Deficiency/Recommendation: Section 5.3.6.2.4, p. WP-378

The second paragraph, seventh line, states that "gross" estimates of aquifer properties can be achieved by the cyclic evaluation technique. It is quite possible to achieve estimates that are as good as, or better than, conventional pumping tests. Remove "gross" from the sentence.

51. Deficiency: Section 5.3.6.4.3, p. WP-381

It is stated that modeling will be performed only at the "end of Phase I investigations". We can probably gain more insight into the groundwater flow system by starting modeling at the beginning of the investigation. This would allow us to identify what factors are most crucial to building a final successful model.

Recommendation:

Start groundwater modeling during the early stages of the investigation and use early results to help guide the investigation.

52. Deficiency/Recommendation: Section 5.3.11, p. WP-385, first paragraph

The last sentence should be rewritten to clearly identify the references to be used for the human and ecological risk assessments.

53. Deficiency/Recommendation: Section 5.3.11, Figure 92, p. WP-387

The information under Toxicity Assessment is incorrect. The appropriate toxicity assessment steps should be provided as found in Chapter 7 of U.S. EPA (1989).

54. Deficiency/Recommendation: Section 5.3.11.2, p. WP-388

As noted in figure 85 on p. WP-271, the primary pathway results from migration of contaminants from the vadose zone to the water table. The exposure assessment described on p. P-388 indicates that numerical modeling will be used to predict the release rates from the various waste sources and environmental transport of contaminants. The work plan does not, however, specifically describe what models will be used to simulate solute transport. It has been agreed in past unit managers' meetings that a standard set of models will be used in all operable units for simulating solute transport in the vadose and saturated zones and that these models (VAM-2D, UNSAT-H, and PORFLO-3) will be supported by the Westinghouse Performance Assessment Group. The specific models proposed for the 100-NR-1 operable unit should be explicitly stated in Section 5.3.11.2 and in other appropriate sections of the work plan.

In simulating water and solute transport in the unsaturated zone, the matric potential and unsaturated hydraulic conductivity of the soils are generally required as input to the model. It is not apparent from the work plan as to how this input information will be provided. Specifically, describe in the work plan how the matric potential and unsaturated hydraulic conductivities will be meausred, how the measured values will be assigned to individual operable units, and how the uncertainty of measured and assigned values will be evaluated.

55. Deficiency: Section 5.3.11.4, p. WP-389, second paragraph

This section discusses risk characterization. However, the text states that "potential human risks . . . will be assessed by comparing acceptable contaminant exposure levels with actual or predicted levels." Comparison of acceptable levels with actual or predicted levels is part of risk management, not risk characterization. While RFI/CMS procedures allow risk characterization and risk management to occur

concurrently, RI/FS procedures do not. Page iii of this document indicates that while RCRA terminology is to be used, CERCLA content and format are to be followed. Therefore, it is more technically correct to simply state that the magnitude of cancer risks and noncancer hazard indices will be presented.

Also, the $10^{-7}$ lifetime cancer risk number is incorrect.

Recommendation:

The text should be changed to state that 1) carcinogenic risks and noncarcinogenic hazard indices will be presented in conjunction with other relevant information and 2) the combined information will assist risk managers in the decision making process. This subject is partially addressed in paragraph four of this section, so paragraphs two and four could be combined.

The lifetime cancer risk number ($10^{-7}$) should be changed to $10^{-6}$.

56. Deficiency/Recommendation: Section 5.3.11.4, p. WP-390, third and fourth paragraphs

The text describes risk management procedures. These procedures are not part of the risk characterization process. The risk management information should be included in a separate subsection.

57. Deficiency/Recommendation: Section 5.4.3.3.2, p. WP-398

In the first paragraph, fifth line, there appears to be a word(s) missing after "...action specific..."

58. Deficiency/Recommendation: Section 5.5.13, p. WP-416, first paragraph

The text states that "the Phase II assessment differs from the baseline assessment in that actual exposure levels will be developed using state-of-the-art modeling techniques." This statement should be clarified, because many baseline risk assessments also use modeling techniques to provide actual exposure levels.

SAMPLING AND ANALYSIS PLAN

Field Sampling Plan

59. Deficiency: Section 2.1.1.2, p. SAP/FSP-5

In this section, a radiological survey is proposed to establish and define the content of surface contamination and potential areas of subsurface contamination in the 100-NR-1 operable unit. Due to adsorption and desorption of radioactive substances in the soil column during groundwater fluctuations, the radioactive substances most probably have migrated laterally and vertically in the subsurface soils.

A surface radiation survey will help locate radioactive substances on or near surface soils only and will most likely fail to detect radioactive substances in subsurface soil columns.

Recommendation:

More extensive subsurface soil sampling should be included to characterize the vadose zone for radiological contamination. Soil boring locations should not be selected on the basis of surface radiation alone. If survey results show negative responses, subsurface soil sampling should be carried out at locations of suspected sources and past releases.

60. Deficiency/Recommendation: Section 2.1.3.1, p. SAP/FSP-8

The first and third paragraphs in this section have conflicting information on the interval length in the grid pattern and should be redefined in one or the other.

61. Deficiency: Section 2.2, p. SAP/FSP-10

The text states that "the purpose of source sampling is only to verify the existence and concentration, not to determine the extent of contamination." The rationale for not determining the extent of contamination is not specified.

Recommendation:

Because existing data for the 100-NR-1 Operable Unit (as presented in Section 3.0) is insufficient to adequately characterize the source, justification should be provided for not determining the extent of contamination of the source.

62. Deficiency: Section 2.2.1.1, p. SAP/FSP-10

The liquid waste loadout station grouping (1314-N) is ranked as 1, the most serious category (Table 59, work plan). The spread of contamination from the two unplanned releases (UN-100-N-13 and UN-100-N-26) and the extent of contaminated soil removed are unknown (Section 3.1.1.1.1, work plan). During the first unplanned release (UN-100-N-13), approximately 100 gallons of reactor solution overflowed the catch basin, the dry well, and nearby ground surface. A 1,000-gallon spill of reactor solution occurred during the second unplanned release. The conditions of the concrete catch basin, dry well, and drain line are unknown, it is possible that the soil is contaminated beneath the catch basin, dry well, and drain line. No soil sampling is proposed to determine the existence of contamination at the catch basin, dry well, drains, or soil (about 20 x 20 feet) inside the radiation zone or the loading station. It is unclear how the two proposed surface soil samples at two valve pit floors will provide adequate data to characterize the source for the liquid waste loadout station grouping (1314-N).

Recommendation:

Because no soil sampling of the sources has been conducted in the past, and the accuracy of information gathered from past records for the extent of releases and spread of contamination is uncertain, additional information should be gathered to design an adequate sampling plan for the liquid waste loadout station grouping.

An enlarged map showing the valve pits, catch basin, and dry well within the loading station and the proximity of existing monitoring wells should be provided to better define the sampling plan.

63. Deficiency: Section 2.2.1.2, p. SAP/FSP-13

Two unplanned releases (UN-100-N-14 and UN-100-N-9) have occurred from a 2-inch diameter, 119-N cooling water drain line. The total activity from both releases was estimated at 4.8 mCi (Section 3.1.1.1.2.1, work plan). The lateral and vertical migration of contaminants from the unplanned releases and the extent of soil removed are unknown. Therefore it is unlikely that the two proposed surface and subsurface soil samples (Table FSP-1) will adequately characterize the sources.

Recommendation:

Additional sampling is recommended to determine the extent of contamination and confirm the effectiveness of past removal of contaminated soil.

64. Deficiency: Section 2.2.1.3, p. SAP/FSP-13

An 80,000-gallon spill of diesel oil (UN-100-N-17) resulted in soil and groundwater contamination west of the 166-N tank farm (Section 3.1.1.1.3.2, work plan). No remedial measures were taken in the past for the contaminated soil and groundwater, except for construction of the trench that was used to intercept the oil before it could reach the river. The vertical and lateral extent of contamination within the earth berm at the tank farm is also unknown. The four proposed surface and subsurface soil samples may not provide adequate data to characterize the diesel oil contamination.

Recommendation:

Additional sampling should be considered to thoroughly characterize the source to determine the extent of contamination.

65. Deficiency: Section 2.2.1.3, p. SAP/FSP-13, second paragraph

The specific activities to be conducted during the nonintrusive investigation are not addressed for the fuel oil unloading station.

Recommendation:

Numerous small, unreported spills occurred during tanker unloading activities (Section 3.1.1.1.3.1, work plan) at the fuel oil unloading station. In addition, the integrity of the piping system and the age and condition of the unloading trench are unknown. Therefore, more information should be provided on the specific activities proposed during the nonintrusive investigation to identify past releases and sources at the fuel oil unloading station.

66. Deficiency: Section 2.2.1.4, p. SAP/FSP-13, first paragraph

The text states that "one surface and subsurface sample will be collected from the area of unplanned release (UN-100-N-31) near the 116-N-1 (1301-N) crib . . . . Figure FSP-1 shows the proposed sampling plan." The unplanned release (UN-100-N-31) is shown inside the 116-N-1 crib and trench in Figure 32 of the work plan. Figure FSP-1 does not show any sampling location inside 116-N-1.

Recommendation:

The location of the unplanned release should be unambiguously identified. In the proposed sampling plan, subsurface sampling intervals and depth should be increased to delineate the extent of contamination.

67. Deficiency: Section 2.2.1.4, p. SAP/FSP-14, first paragraph

The text states that "no source sampling is planned for the 116-N-1 (1301-N) crib and trench." No rationale is given for omitting source samples within the 116-N-1 crib and trench.

Recommendation:

Large quantities of radioactive substances and dangerous wastes were disposed of in the 116-N-1 crib and trench for infiltration, decay, and degradation through the soil column. Existing data are insufficient to determine the extent of contamination at the 116-N-1 crib and trench (Section 3.1.1.1.4.1, work plan). Therefore, a sampling plan for characterizing the 116-N-1 crib and trench should be considered in order to evaluate whether the source is contributing to groundwater contamination.

68. Deficiency: Section 2.2.1.5, p. SAP/FSP-14

The proposed surface and subsurface soil sampling to a depth of 4 feet may fail to indicate the existence of contamination from the unplanned release to the ground (UN-100-N-5) of 90,000 gallons of radioactive chemical waste (Section 3.1.1.1.5.1, work plan).

Recommendation:

Subsurface soil samples taken at closer intervals and extending beyond 4 feet should be considered at the proposed locations. If samples are contaminated with radioactive and dangerous chemicals, additional sampling should be proposed for the Phase II study.

69. Deficiency: Section 2.2.1.5, p. SAP/FSP-14, third paragraph

The 124-N-4 septic tank system consists of two septic tanks (Section 3.1.1.1.5.2, work plan). Only one sample is proposed from the contents of the septic tank (Table FSP-1). Also, the sampling location is unclear.

Recommendation:

One sample from each septic tank should be collected to identify the contaminated tank. If tank contents were never removed, a composite sample from the bottom, middle, and top of the settled sludge contents should be collected to adequately assess the tank contents for radioactivity and other contamination.

70. Deficiency: Section 2.2.1.5, p. SAP/FSP-14, third paragraph

The collection of subsurface samples from the septic tank effluent drainfield at a depth of 4 feet below ground surface may not indicate the existence of contamination.

Recommendation:

The drainfield is situated close to the area where tanker trucks were loaded with irradiated neutralized decontamination solution (Section 3.1.1.1.5, work plan). The engineering and construction details are unknown. Based on the engineering details for specifying depth and construction materials for the drainfield, subsurface samples should be collected at close intervals from the surface to bottom of the drainfield to determine the presence of contaminants. Additional subsurface samples should be collected below the bottom of the drainfield to assess the extent of contamination from infiltration and seepage from the disposal of septic tank effluents as well as the unknown intermittent releases from the tanker truck loading area.

71. Deficiency: Section 2.2.1.6, p. SAP/FSP-14

No rationale is given for omitting source sampling at the 116-N-3 (1325-N) crib and trench. The text refers to nonintrusive vadose zone and groundwater investigations to address this source. However, the type of activities planned for nonintrusive sampling are not specified for the grouping. No sampling plan for the vadose zone within the crib and

trench is provided. Although vadose zone samples are proposed in conjunction with monitoring well installation outside the boundary of the crib and trench, these samples may not indicate the extent of vadose zone contamination. Groundwater investigations may indicate only the possible sources but may not address the extent of contamination. In general, there is no explanation provided on how nonintrusive sampling, vadose zone sampling from the proposed monitoring wells, and groundwater investigations will address source characterization.

Recommendation:

The 116-N-3 crib is a dangerous waste disposal facility under RCRA interim status (Section 3.1.1.1.6, p. WP-110) that has contaminated groundwater. Limited surface and subsurface soil samples were collected from outside the crib and trench and the vadose zone monitoring wells (Figure 63, p. WP-172). No sampling is proposed for the crib and trench. A source sampling plan should be included to determine the existence of contaminants and extent of contamination within the vadose zone of the crib and trench. These data may indicate whether the contaminants have migrated from the crib and trench, reaching the groundwater, or whether the unattenuated or less attenuated contaminants are retained within the soil column and vadose zone of the crib and trench.

72. Deficiency: Section 2.2.2.1, p. SAP/FSP-17

Two documented releases (UN-100-N-3 and UN-100-N-12) occurred from the piping system associated with the spacer storage silos and the 105-N fuel storage basin (Section 3.1.1.2.3.1, p. WP-122). A total of 610,000 gallons of irradiated 105-N fuel storage basin water entered the groundwater from a cracked 3-inch pipe approximately 11 feet below grade. No soil sampling data were acquired in conjunction with these releases. The depth of excavation and the areas of contaminated soil removed or covered also are not documented. The proposed single surface sample and single subsurface sample from a depth of 4 feet may not adequately indicate the location and existence of contaminants for the 118-N-1 spacer storage silo grouping.

Recommendation:

Because the releases have occurred from a pipe approximately 11 feet below grade and the extent of soil contamination is unknown, a more extensive soil sampling plan should be proposed to determine the existence of contaminants and the extent of contamination at the 118-N-1 spacer storage silo grouping.

73. Deficiency: Section 2.2.2.2, p. SAP/FSP-17

An unplanned release (UN-100-N-35) of irradiated water from the 105-N spent fuel storage basin occurred through a leaking expansion joint 28 feet below ground level. The amount of the release and the extent of contamination are not documented (Section 3.1.1.2.5, p. WP-125). It is

unclear how a single surface sample below the construction expansion joint will provide adequate data to characterize the source that has contributed contaminants to the groundwater.

Recommendation:

Additional samples should be collected below the expansion joint. If the soils are contaminated, then more extensive sampling may be required to delineate the lateral and vertical extent of contamination.

74. Deficiency/Recommendation: Section 4.1.3, p. SAP/FSP-29

See comment in Section 5.3.4.2.3, WP-355.

75. Deficiency: Section 4.1.5, p. SAP/FSP-30

The spring/seep flow reflects a combination of bank storage and groundwater flow. The flow from the springs/seeps presumably will decrease with time (after the initial river stage decline). The trend in discharge with time needs to be tracked in similar fashion to the trend in water quality with time. (See comment on Section 5.3.4.2.3, p. WP-355).

Recommendation:

The flow should be measured at regular intervals during the entire period of low river stage.

76. Deficiency: Section 5.0, p. SAP/FSP-31

The objective of the vadose zone investigation is to determine the presence and spatial distribution of contamination (Table 56, work plan). Soil samples from the vadose zone in conjunction with the proposed monitoring well installation may not provide adequate data to meet the objectives for vadose zone characterization.

Recommendation:

Extensive surface soil sampling has been conducted since 1975 and the concentrations of most of the constituents have been decreasing since 1980 (Section 3.1.2.1.1.1, p. WP-140). However, very few soil samples were collected within the vadose zone of 100-NR-1 Operable Unit (Section 3.1.2.1.1.2, p. WP-170). Most of the unplanned release locations throughout the 100-N area have not been sampled to determine the extent of contamination (Section 3.1.2.1.5, p. WP-183). It is also reported that the unsaturated soil column directly below the release locations may still contain most of the long-lived radionuclides. At locations where earlier releases have occurred (such as 116-N-2 radioactive chemical waste treatment and storage tank, 118-N-1 spacer storage silo, and 1314-N liquid waste loadout station, and 1304-N emergency dump tank), the contaminants, particularly the long-lived radionuclides, are

expected to be present in the vadose zone as well as in the saturated soils, resulting in groundwater contamination.

Sufficient data are not available to adequately evaluate the extent of vadose zone contamination for the 100-NR-1 and 100-NR-2 Operable Units. Therefore, a more detailed vadose zone sampling plan should be provided to determine the extent of soil contamination and to meet the objectives of the vadose zone investigations.

77. Deficiency: Section 5.1, Table FSP-5, p. SAP/FSP-37

No rationale is given for omitting chemical analysis of soil samples from wells N-C-Au, N-J-Au, N-K-Au, and N-L-Au.

Footnote 4 is not provided.

Recommendation:

Because very few data are available for subsurface soil samples in the vadose zone, subsurface soil samples taken during the installation of wells N-C-Au, N-J-Au, N-K-Au, and N-L-Au should be analyzed for chemicals to determine the nature and extent of contamination in the vadose zone.

78. Deficiency/Recommendation: Section 6.1.2.2.4, Table FSP-6, p. SAP/FSP-43

It is stated that existing well N-19-Au is paired with well N-D-B. Howevr, well N-D-B is not mentioned in either the work plan or the field sampling plan. The text should include the proposed location of well N-D-B.

Quality Assurance Project Plan

80. Deficiency/Recommendation: Table of Contents, p. SAP/QAPP-iv

The title of Table QAPP-4, Sample Containers and Preservation Requirements for Soil/Sediment Samples, does not correspond with Table QAPP-4 in the text and should be corrected.

81. Deficiency/Recommendation: Section 1.1, p. SAP/QAPP-1, first paragraph

The term "nonvolatile organic contaminants" should be changed. The text appears to refer to semivolatile contaminants, because Table QAPP-1 refers to semivolatile organic species.

82. Deficiency/Recommendation: Section 2.1, p. SAP/QAPP-5, second paragraph

The organizational charts mentioned in this section and found in the project management plan are incomplete. The charts should include the names of individual personnel involved with this operable unit.

83. Deficiency/Recommendation: Section 2.2, p. SAP/QAPP-5, fourth paragraph

The text states that "services of alternate qualified laboratories shall be procured for radioactive sample analysis (if on-site laboratory capacity is not available) . . ." The QAPP should name the outside laboratories proposed for this work.

84. Deficiency/Recommendation: Section 3.0, p. SAP/QAPP-6, third paragraph

According to the text, the level of radioactivity found in the samples during the screening process will determine whether or not analyses will be performed on-site or off-site. The text should specify the level of radioactivity that will serve as the criterion for making this decision.

85. Deficiency/Recommendation: Section 3.0, p. SAP/QAPP-7, first paragraph

The text states that for Level IV data, "full CLP analytical methods and protocols will be used on approximately 20% of the samples." This percentage may not be acceptable. An explanation should be provided for not using full CLP analytical methods and protocols on 100 percent of the Level IV samples.

86. Deficiency: Section 3.0, p. SAP/QAPP-16, first paragraph

The text states that "after individual laboratory SOWs are negotiated and procedures are developed and approved, Table QAPP-1 and this section will be revised to reference approved detection limits, precision, and accuracy criteria as project requirements." These items should be available prior to QAPP approval. Some of the analytical parameters may require special analytical methods. By establishing analytical methods, detection limits, accuracy, and precision prior to QAPP approval, data discrepancies may be avoided later.

Recommendation:

Analytical methods and criteria should be specified in the text and Table QAPP-1 at this stage.

87. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-8

The maximum detectable concentrations (MDC) in soil for many of the parameters listed in this table are expressed in $\mu$g/L and should be expressed in $\mu$g/kg.

88. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-9

The MDC values for lead and total cyanide are reported as 1 mg/kg and 500 mg/kg, respectively. These values are incorrect and should be changed to 0.6 mg/kg for lead and 2 mg/kg for total cyanide. In

addition, the method detection limit (MDL) for lead reported as 5 μg/L should be changed to 3 μg/L.

The detection methods and MDC for zirconium are reported as "Westinghouse." Instead, an established EPA method and MDC should be proposed. If no established method exists, then a special analytical service (SAS) method should be proposed.

The units given for MDC values are incorrect and should be expressed as either μg/kg or mg/kg.

Both the MDC and MDL values for 2-hexanone are reported as 50μg/L. These values are incorrect and should be changed to 10 μg/kg and 10μg/L, respectively.

The MDC and MDL quantitation limits are omitted for bromomethane and should be included.

The pesticide MDC values listed in this table are incorrectly reported as μg/L and should be changed to either μg/kg or mg/kg.

The pesticides 2,4,5-TP (Silvex) and 2,4-D are not on the CLP list. Therefore it is not correct to reference CLP methods for these species. If approved EPA methods do not exist, then SAS methods should be used.

MDL values for the pesticides methoxychlor, alpha-chlordane, and gamma-chlordane are each incorrectly reported as 0.05 μg/L and should be changed to 0.50 μg/L.

89. Deficiency/Recommendation: Section 3.0, p. SAP/QAPP-16, first paragraph

The text should include a more detailed discussion on corrective action.

90. Deficiency/Recommendation: Section 4.2.1, p. SAP/QAPP-17, second paragraph

A more detailed discussion of sampling preparation methods, equipment, storage, and transportation should be included in this section, for the purpose of ensuring sample integrity.

91. Deficiency/Recommendation: Section 5.0, p. SAP/QAPP-18, first paragraph

The section on sample custody is incomplete and should include more detailed information on documentation of preparation methods, personnel responsibilities during sampling, analytical methods, and laboratory custody. Documentation of shipping samples should also be included in this section. A statement should be included to clarify where the samples will be maintained. Additionally, copies of sample custody strips, chain-of-custody forms, and sample labels should be included.

92. Deficiency/Recommendation: Section 4.2.2, Table QAPP-3, p. SAP/QAPP-22

All target analyte list (TAL) parameters are condensed under one general heading. This is not appropriate because mercury and hexavalent chromium do not follow these general guidelines.

In addition, holding times for many of these compounds are incorrect and should be changed.

Also, the compounds such as radionuclides, sulfamate, and oxalate whose requirements are referred to as "Westinghouse" should be researched to determine sample container and preservation requirements. If standard EPA methods are not available, then SAS methods should be used.

93. Deficiency/Recommendation: Section 4.2.2, Table QAPP-4, p. SAP/QAPP-23

Mercury does not follow general TAL parameters, so it should not be listed under the general TAL heading.

94. Deficiency/Recommendation: Section 8.1, p. SAP/QAPP-27

This section should include the data reporting scheme from start to finish, including data reduction, validation, and reporting. A flowchart describing the data reporting scheme could be used to present this information.

This section should also include a discussion of action to be taken if quality assurance criteria are not met and methods of handling data outliers.

95. Deficiency/Recommendation: Section 9.0, p. SAP/QAPP-31, second paragraph

Internal quality control checks are not included for matrix spike duplicates, laboratory blanks, surrogate spikes, and internal standards, but should be included.

96. Deficiency/Recommendation: Section 12.0, p. SAP/QAPP-34, fourth bullet

The formula for calculating the MDL referred to in this section does not follow the standard EPA practice for this calculation and should be changed in accordance with EPA (1987).

97. Deficiency/Recommendation: Section 12.0, p. SAP/QAPP-34

The formula for calculating completeness is missing and should be included in this section.

98. Deficiency/Recommendation: Section 1.1, p. DMP-1

The last line in the section states that the EIMP is expected to be revised and expanded in FY 1990. Update status.

99. Deficiency/Recommendation: Section 4.0, p. DMP-24

See comment on Section 1.1, DMP-1.

## TYPOGRAPHICAL ERRORS

Section 2.1.2, p. WP-16

The words "Hanford Generating" are missing from the beginning of the first line.

Figure 9, WP-33

The subgroup "Yakima Basalt Group" should terminate at the Grande Ronde Basalt-Imnaha Basalt contact. Add a line separating these units.

Section 2.2.3.2.4, p. WP-57

The second paragraph, fourth line, reads "...the more the recently...". Remove the second "the".

Section 2.2.3.2.4, p. WP-61

The third paragraph, third line, reads "...an 300 gal/min...". This should read "...and 300 gal/min...".

Figure 24, p. WP-63

The northern ends of the "388-foot" and "389-foot" contours are mislabeled (389 and 390).

Section 2.2.6.1, p. WP-72

In the last paragraph, first line, "edemic" should be "endemic".

Table 4, pp. WP-79 and WP-79

Item number 3 reads "166-N Fuel...". Should this be 116-N Fuel..."?

Table 12, p. WP-171

Footnote gives "*" as standing for "NOT DETECTED", but table uses "ND".

Section 3.1.2.2.2, p. WP-187

In paragraph one, lines two and four, "...year...", should be "...years...".

Section 3.1.2.2.2, p. WP-191

The second paragraph, next to last line, reads "...sampled an analyzed...", should be "...sampled and analyzed...".

Section 3.1.2.2.3, p. WP-191

First paragraph, ninth line, "standard" should be "standards".

Section 3.1.2.2.3, p. WP-191

Second paragraph, second line, "begin" should be "beginning".

Section 3.1.2.2.4, p. WP-203

In the second paragraph, eight line, "...year." should be "...years."

Section 3.1.2.2.4, p. WP-217

In the fourth paragraph, third line, "measure..." should be "...measured...".

Section 3.1.2.2.5, p. WP-218

In the first line of the section, "of" was left off the end of the line.

Section 3.1.2.2.5, p. WP-220

In the second paragraph, ninth line, "...detect limits." should be "detection limits...".

Section 3.1.2.2.5, p. WP-220

In the third paragraph, second line "...well N-23 and N-26..." should be "...wells N-23 and N-26...".

Section 3.1.6, p. WP-256

Last paragraph, sixth line, "...expected)." should be "expected ...".

Section 5.3.2.2.3, p. WP-332

Second paragraph, third line, "...25 ft." should be "...25 ft centers."

Section 5.3.2.3, p. WP-332

Second paragraph, seventh line, "...bonding..." should be "....bounding...".

Section 5.3.3.3, p. WP-350

Line 5, "...analyses is..." should be "....analyses are..."

Figure 91, p. WP-365

"Ringold Confining Aquifer B" should be "Ringold Confined Aquifer B".

Section 5.3.6.1.1, p. WP-372

The last paragraph, first line, "...data was..." should be "...data were..."

Section 5.3.6.2.2.3, p. WP-376

The first paragraph, fifth line, "...water changes..." should be "...water, changes..."

Section 5.3.6.2.2.5, p. WP-377

A word(s) appear to be missing from the sentence starting on WP-376 and continuing on p. WP-377.

Section 5.3.12.1, p. WP-390

The first line reads "...pertinent of...", it should be "...pertinent to...".

Section 5.5.4.1, p. WP-405

Line six, "...spring..." should be "springs...".

Section 5.5.4.2, p. WP-405

Line three, "...form..." should be "...from..."

Section 5.5.5.1, p. WP-406

The second paragraph, first line, "Solid..." should be "Soil..."

Section 2.2.1.3, p. SAP/FSP-13

Should "166-N Fuel..." be 116-N Fuel..."

Section 6.1.2.2.1, p. SAP/FSP-40

Paragraph two, line five, "...on the upper..." should be "...in the upper..."

Section 6.1.2.2.1, p. SAP/FSP-40

Paragraph two, line seven, should "Ab" be "A1"?

Section 6.1.4, p. SAP/FSP-47

Last paragraph, seventh line, should "...technique to..." be "technique will..."?

Section 6.2, p. SAP/FSP-48

Line 4, "...identification contaminants..." should be "...identification of contaminants..."

Section 1.3, p. SAP/QAPP-1

Line four, remove "...RFI..." at end of line?

Section 3.0, p. SAP/QAPP-7

Last paragraph on page, line 1, "...Duality..." should be "...Quality..."

Section 3.2.8, p. DMP-22

Second line "...meteorological." should be "...meteorological data."

## REFERENCES


Sweeney, C., 1990, Environmental Protection Agency Region 10, Risk Assessment Branch, personal communication with Audree DeAngeles, PRC Environmental Management, Inc., December 12, 1990.

U.S. EPA, 1989, Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A, U.S. Environmental Protection Agency, EPA/540/1-89/002, December 1989.

U.S. EPA, 1987, Preparation Aid for HWERL's Category I Quality Assurance Project Plans, U.S. Environmental Protection Agency, Office of Research and Development, Hazardous Waste Engineering Laboratory, Cincinnati, OH, QAPP-0007-GFS, June 1987.

HANFORD SITE 100-NR-3 OPERABLE UNIT
RICHLAND, WASHINGTON
TECHNICAL REVIEW OF RFI/CMS WORK PLAN

## GENERAL COMMENTS

The information presented in Section 3.1 - Known and Suspected Contamination - indicates that, compared to other operable units that we have examined to date, 100-NR-3 contains relatively little residual contamination. Apparently NR-3 was assigned a high priority due to the large volumes of caustic waste disposed of in the 1324-NA percolation pond. Most of this caustic waste has infiltrated to groundwater and is, therefore, within the scope of the 100-NR-1 RFI/CMS. As a source operable unit, the existing information indicates that 100-NR-3 probably contains relatively small amounts of residual toxic material, and in fact, presents a minor threat to human health and the environment. We, therefore, question whether a full RFI/CMS needs to be devoted to the 100-NR-3 Area.

Although the text implies that more information is available, minimal data are provided in the work plan. Section 1.3.2, page WP-9, paragraph 3 of the text states that "preparation of this work plan involved preliminary evaluation and summarization of a large volume of existing documentation..". Paragraph 5 of this section states that the preliminary evaluation "entailed examination of disposal, unplanned release, and environmental monitoring records. . .". Results of the preliminary evaluation of existing data should be included in Section 3.0 of the work plan.

In addition, inadequate source sampling is provided to characterize the sources. The general statement that nonintrusive investigation will address the sources is inadequate. The type of nonintrusive survey planned for each source should be specified. No sampling plan is provided for vadose zone monitoring either in this work plan or in the 100-NR-1 Operable Unit work plan.

## SPECIFIC COMMENTS

WORK PLAN

1. Deficiency: Section 1.2, p. WP-4

   The text misleadingly states that:

   > The purpose of this RFI/CMS work plan is to define specific strategies, procedures, and activities required for successful completion of the RFI/CMS at 100-NR-3. This entails identification and evaluation of all known operational and environmental information and development of plans for the collection of additional data necessary to adequately characterize the nature, extent, and rate of migration of contamination at the site. . .

However, the field sampling plan includes only source sampling which (p. SAP/FSP-8) "will be conducted to determine the existence and concentration of contaminants." No sampling to determine the extent of contamination is included in this work plan. Only Section 1.3.2 (p. WP-9) explains that "scoping studies and work plans are focused on the RFI Phase I, which consists of the initial characterization of the site."

Recommendation:

The scope and objectives of the work plan should be clearly presented. A description of each phase, including its objectives and activities, should be included. The misleading statements quoted above should be changed accordingly.

2. Deficiency: Section 1.3.1, p. WP-7, first paragraph

The text states that "contaminated soils" are within the scope of work for this work plan. It is unclear whether this statement refers to surface soils only, or includes soils in the vadose zone.

Recommendation:

The text should clarify whether the vadose zone is part of the scope of this work plan and how vadose zone investigations at 100-NR-3 will be coordinated with the 100-NR-1 investigation.

3. Deficiency: Section 1.3.1, p. WP-7

In Sections 1.3.1 and 2.2, it is stated that the 100-NR-3 RFI/CMS will not directly investigate the release of contaminants to groundwater. As shown in Figure 43, infiltration of contaminants from the vadose zone to groundwater is the primary contaminant exposure pathway of this operable unit. In order to conduct a defensible risk assessment, contaminant transport along the primary exposure pathway must be evaluated. The approach taken in other Hanford Site RI/FS and RFI/CMS work plans has been to characterize the transport of contaminants through the vadose zone to the water table under the scope of the source operable unit work plans and to include transport of contaminants in the saturated zone within the scope of the groundwater operable units. As a source operable unit, the focus of the 100-NR-3 RFI, therefore, should be directed to investigating the release of contaminants to groundwater.

Recommendation:

Include investigation of release of contaminants to groundwater as a part of the 100-NR-3 RFI/CMS. It is acknowledged that information resulting from the 100-NR-1 RFI should be applicable and useful to the characterization of contaminant transport mechanisms in the 100-NR-3 operable unit. However, site specific data on the distribution of contamiants in the vadose zone and the chemical and physical

characteristics of the vadose sediments directly below individual waste management units must be collected and evaluated within the 100-NR-3 operable unit. Because the degree of contamination within 100-NR-3 is largely unknown, this work logically should be done as a Phase II activity, once the results of source sampling has been evaluated. The work, however, should be noted and described within this work plan.

4. Deficiency/Recommendation: Section 3.0, p. WP-51

The N-Reactor went into production in December 1963. Eight of the ten unplanned releases documented in Table 2 and elsewhere in Section 3.0 occurred in the 1980's, and the remaining two unplanned releases occurred in the 1970's with the earliest listed as 1973. Were there no unplanned releases from 1963-73, or were they just not documented? Please comment on the status of reporting unplanned releases prior to 1980 and describe the uncertainty, if any, of the data used to document unplanned releases.

5. Deficiency: Section 3.1, p. WP-51, first paragraph

The paragraph is misleading, stating that "evidence for the release of hazardous and mixed waste constituents is presented in the following section. A description of the sources of contamination in the 100-NR-3 operable unit is followed by discussions of monitoring results for environmental and biological media." Section 3.1.2.1 states that the only soil sampling data examined in 100-NR-3 were background soil data in the area of the 120-N-1 and 120-N-2 ponds.

Recommendation:

This apparent inconsistency should be resolved.

6. Deficiency/Recommendation: Section 3.3.1.1, p. WP-120, first paragraph

It appears that the reference given as 1986b should be 1989b.

7. Deficiency/Recommendation: Section 3.3.2.2, p. WP-122, first paragraph

The contaminants of concern are presented in three bulleted groupings. It is not immediately apparent that these groupings represent all the contaminants presented in Table 2 (p. WP-53). To prevent confusion, it would be helpful to include a brief statement to the effect that the bulleted groups represent all the contaminants in Table 2 in a summarized fashion.

8. Deficiency: Section 3.3.2.2, p. WP-122, last paragraph

The text states, "Air release of contaminants does not appear to pose a health threat to the public." The text then refers to Table 10 (p. WP-106) for supporting data. Table 10 shows a reduction in air emissions

over a number of years, but it is not clear how the volume that is currently emitted impacts the public, the worker population, or the environment.

Recommendation:

The statement should be further supported with numerical values, in units such as parts per million, which can then be compared to applicable or relevant and appropriate requirements (ARARs) or to-be-considered (TBC) values. The values would also be useful for worker and ecological risk assessments.

9. Deficiency/Recommendation: Section 3.3.2.2, p. WP-122

The text states that the appropriate corrective action requirement for the contaminants should be background. The method for determining background levels should be described.

10. Deficiency: Section 3.3.3, p. WP-122

The text states that "based on environmental data available, the 100-NR-3 operable unit does not appear to pose an imminent or substantial threat to public health or the environment." However, Section 3.1.2.1 states that the only soil sampling data examined in 100-NR-3 were background data. The quoted conclusion is not justified on the basis of background data alone.

Recommendation:

Supporting data for the quoted conclusion should be provided.

11. Deficiency/Recommendation: Section 3.3.4, p. WP-123, first paragraph

Potential future adverse impacts from 100-NR-3 are attributed to possible discharges to groundwater or uncontrolled access to the operable unit. A brief statement discussing potential adverse impacts related to future land uses should be included.

12. Deficiency/Recommendation: Section 3.3.5, p. WP-125, first paragraph

The text states, "An imminent and substantial hazard does not appear to exist at the 100-NR-3 operable unit." Uncertainties are then discussed and the inability to perform a quantitative risk assessment is stated. In addition, it would be beneficial to discuss the dynamics of the RFI/CMS process and explain that if an imminent and substantial hazard becomes apparent as additional data are gathered, then interim corrective actions will be taken.

13. Deficiency: Section 4.2.1, p. WP-134, second paragraph

The text states that ". . . an evaluation of the nature and extent of contamination. . ." will be performed as part of site characterization.

The text further states that this evaluation will be performed by ". . . the collection of necessary geologic, hydrologic, and meteorologic data as well as data on specific contaminants and sources." However, page SAP/FSP-8 clearly states that "the purpose of source sampling is only to verify the existence and concentration, not to determine the extent, of contamination." It is unclear how all this information will be combined to determine the extent of contamination.

Recommendation:

Clarify how the extent of contamination will be determined. A phased approach is suggested. If a particular source is found to contain contamination, further investigation should be initiated to determine the extent. Only after the extent is known can corrective measures be properly selected.

14. Deficiency/Recommendation: Section 4.2.1, p. WP-134, third paragraph

The term "performance assessment models" should be defined. The type of models to be used should be specified.

15. Deficiency: Table 21, p. WP-138

The EII is noted in Table 21 to be the reference for the analytical method to be used for surface geophysical measurements, including electromagnetic induction, magnetometry, and ground penetrating radar. However, EII 11.2 - Geophysical Survey Work - includes a description of the method only for ground penetrating radar.

Recommendation:

Either update EII 11.2 to include a description of the methods for electromagnetic induction and magnetometry or provide an additional reference for these methods.

16. Deficiency/Recommendation: Section 5.3.2.2.1.1, p. WP-164

The topographic base map is noted as having an elevation contour interval of 2 feet. It should be noted that the base map will be digitized to be incorporated into the GIS component of HEIS. HEIS has adopted a metric standard, and to be compatible, the base map should be developed with metric (1/2 meter) contour intervals.

17. Deficiency: Section 5.3.2.3, p. WP-166

The text states, "The purpose of source sampling is only to verify the existence and concentration of potential contaminants, not to determine the extent of contamination. Therefore, a minimum number of samples will be collected." It is unclear how the stated purpose of source sampling will meet the objectives for baseline risk assessment (as in Section 5.3.11, p. WP-189). One of the factors that affects the level of effort of the baseline risk assessment is the need to determine the

areal extent of contamination. The proposed minimum number of samples will not provide adequate data for baseline risk assessment for the sources where unplanned releases have occurred.

Recommendation:

The text should explain how the stated purpose of source sampling with a minimum number of samples will meet the requirements of determining the areal extent of contamination for baseline risk assessment.

18. Deficiency/Recommendation: Section 5.3.2.3, p. WP-166

In task 2C - Source Sampling - subsurface samples are proposed to be collected at a depth of 4 feet at several waste site groupings. Yet no justification is given for the collection of samples at this depth until Section 2.2 of the sampling and analyses plan. In Chapter 5, the reader is left with the impression that the selection of a 4 foot sampling depth is arbitrary and, therefore, unsupportable. We recommend that the justification for sampling at the 4 foot depth be included in Section 5.3.2.3.

19. Deficiency: Section 5.3.2.3, p. WP-166

There is no discussion of source sampling for the 1716-N service station underground storage tanks (Section 3.1.1.7.2, p. WP-80) under the nonhazardous and nonradioactive storage area grouping. However, sampling of these areas is listed in Table 24 (p. WP-169). No source sampling is planned for the 1716-N service station underground storage tanks. Tank 100-N-55-27, which was installed in 1967, has no cathodic or interior protection. Hence, there is a possibility of gasoline leaks contaminating the surrounding soil.

Recommendation:

A soil sampling plan should be included in addition to a soil gas survey during nonintrusive investigation of the tanks.

20. Deficiency: Section 5.3.2.3.2.1, p. WP-171

No source samples are planned for the outer refuse area grouping. It is stated that the nonintrusive investigation will address these units. There is no mention here or in the field sampling plan of the specific nonintrusive surveys to be used for this grouping.

Recommendation:

The specific nonintrusive surveys to be performed for the outer refuse area grouping prior to sampling activities should be identified.

21. Deficiency/Recommendation: Section 5.3.2.3.2.2, p. WP-171

It is proposed to collect one sample from the contents of the 124-N-2 septic tank. Details should be provided on where the sample will be collected, that is from the top, middle, or bottom of the septic tank.

22. Deficiency: Section 5.3.2.3.2.2, p. WP-171, second paragraph

No source sampling is proposed for the 182-N tank farm overflow, the 182-N drain outfall, or the February 6, 1987 unplanned release. Nonintrusive surveys are proposed for these sources. There is no mention here or in the FSP of the specific nonintrusive surveys proposed for these sources.

Recommendation:

The type of nonintrusive survey to be used for each of these sources prior to sampling activities should be clearly specified.

23. Deficiency: Section 5.3.2.3.2.2, p. WP-171, first paragraph

No source sampling is proposed for the seepage pit associated with the 124-N-2 septic tank. The seepage pit has been active since 1963 (Section 3.1.1.2.1, p. WP-60). The types of chemicals that may have entered the seepage pit along with septic tank effluent in the past are unknown. The seepage pit is a potential source of contamination.

Recommendation:

It is recommended that at least two samples be collected from the pit, one surface sample at the bottom of the pit and one subsurface sample 5 feet below the bottom of the pit.

24. Deficiency: Section 5.3.2.3.2.3, pp. WP-171 to WP-172

A total of 25 samples are proposed to determine the existence of contaminants in the acid/caustic storage and transport system grouping, excluding the regeneration waste transport system and septic tank. It is stated in Section 5.3.2.4, page WP-174 that all these source samples will be analyzed for the listed comprehensive analyses and parameters (Table 25, p. WP-175). The sources in the acid/caustic storage and transport system grouping (excluding the regeneration waste transport system and septic tank) received sulfuric acid and sodium hydroxide during transfer or neutralization of these liquids (Section 3.1.1.3, pp. WP-62 to WP-67). The only suspected contaminants are the sulfate and sodium ions at these sources. It is unclear why the listed comprehensive analyses and parameters should be analyzed for all 25 samples.

Recommendation:

There is no need to perform laboratory analysis for the listed comprehensive analyses and parameters for all 25 samples. Because the contaminants of concern are only sulfate and sodium from these sources, it is recommended that the analyses be performed only for a very few samples.

25. Deficiency/Recommendation: Section 5.3.2.3.2.3, p. WP-172, fifth paragraph

Refer to the previous comment on Section 5.3.2.3.2.2 for septic tank sampling.

26. Deficiency: Section 5.3.2.3.2.5, p. WP-173

One surface soil sample and one subsurface sample are proposed for each of the unplanned releases, UN-100-N-18, UN-100-N-22, and UN-100-N-23. The specified depth of the subsurface samples is 4 feet below the ground surface.

A sizable amount of diesel oil was spilled during these unplanned releases, contaminating the subsurface soils and groundwater (Section 3.1.1.5.3, p. WP-76). Oil was detected and recovered from the groundwater through groundwater monitoring well N-16. There is no documentation regarding the specific location of the leak or depth and extent of contaminated soil removal. It is unclear how the proposed single surface and subsurface soil (4 feet below surface) samples will determine the presence of contaminants from the past unplanned releases.

Recommendation:

It is recommended that the total number of surface and subsurface soil samples be increased to at least six for each unplanned release. In the excavated areas, these samples should be collected below the excavated fill.

27. Deficiency: Section 5.3.2.3.2.6, p. WP-173

One surface soil sample and one subsurface sample are planned for the decontamination drain line leak (grouping 6). A leak of radiologically contaminated water occurred at four locations along the chemical decontamination waste drain line (UN-100-N-6). A volume of 590 cubic feet of contaminated soil reading between 7,000 and 25,000 counts per minute was removed and drummed for disposal (Section 3.1.1.6, p. WP-77). It is unclear how one surface soil sample and one subsurface sample will indicate the existence of contaminants at the unplanned release, when the leak occurred at four locations along the drain line.

Recommendation:

Because the unplanned release had occurred at four locations along the decontamination drain line between 105-N reactor and the 116-N-2 radioactive chemical waste treatment and storage facility, a minimum of one surface soil sample and one subsurface sample should be collected at each of the four locations. At the excavated and backfilled locations, soil samples should be collected below the clean fill.

28. Deficiency: Section 5.3.2.3.2.7, p. WP-173

No source sampling is planned for the nonhazardous and nonradioactive storage area grouping. Prior to 1985, the area was unpaved and used as a laydown yard for radioactive-contaminated equipment as well as for storage of radioactive-contaminated oils (Section 3.1.1.7.1, p. WP-77). There is a possibility of contaminant release from the washings of the area to the soil through the unpaved surface. The area is currently paved with concrete, and the proposed nonintrusive surface radiation survey may fail to detect the contamination of soils below the paved area.

Recommendation:

A surface and subsurface soil sampling plan should be included to determine the existence of contaminants from this source due to past practices.

29. Deficiency/Recommendation: Section 5.3.2.4, p. WP-174

Section 5.3.2.4 indicates that laboratory analyses will be conducted on all source samples (soil, water, and sludge) and Table 25 lists the minimum detection concentration (MDC) and expected precision and accuracy values for the laboratory analyses. Section 3.0 of the Quality Assurance Project Plan (SAP/QAPP-15) notes that "Task 2 soil samples will also be analyzed using laboratory screening methods. Do these laboratory screening methods have the same MDC and precision and accuracy values as those listed in Table 25? If not, some mention of the screening techniques and their expected detection, accuracy, and precision values should be noted in Section 5.3.2.4 of the work plan, Section 2.3 of the Sampling and Analyses Plan, and Section 3.0 of the Quality Assurance Project Plan. The discussion of the laboratory screening program should be noted in the SAP and probably in Chapter 5 as well.

30. Deficiency/Recommendation: Section 5.3.3, p. WP-183

The geologic nature and extent of soils "and other surficial materials" will be characterized to determine the effect on infiltration (of precipitation) and contaminant transport in the vadose zone. Research at Hanford has shown that the vegetative cover as well well as soil

texture has a profound affect on infiltration and recharge below the root zone. Is vegetative cover included in "other surficial materials" to be characterized? If so, please say so, and if not, include in this and other appropriate sections.

31. Deficiency: Section 5.3.5, p. WP-185

It is stated that sampling and analysis of the vadose zone materials will be conducted during the source sampling activities in Subtask 2C, and data collected will be integrated with data collected in the 100-NR-1 groundwater investigation. However, there is no sampling plan for vadose zone investigation listed in Table 24 for source sampling at 100-NR-3. Nor are there monitoring well installations near the unplanned releases to collect vadose zone samples during the Phase I 100-NR-1 groundwater investigation. In addition, most of the unplanned release locations in 100-NR-3 have not been sampled to determine the extent of contamination (Section 3.1.2.1.2, p. WP-98).

Recommendation:

The text should explain how the data collection objectives for 100-NR-3 presented in Table 19 (p. WP-136) will be met for the vadose zone without a soil sampling plan to determine the presence and spatial distribution of contamination.

32. Deficiency/Recommendation: Section 5.3.11.1, p. WP-189, first paragraph

The methods that will be used to determine the contaminants of concern should be expanded. The criteria listed in this paragraph are appropriate. However, a discussion should be included on comparison of analytical data to background data and existing chemical-specific ARARs.

33. Deficiency: Figure 46, p. WP-190

The box describing Toxicity Assessment is incorrect. It is a duplicate of the Exposure Assessment box.

Recommendation:

The appropriate toxicity assessment steps should be inserted as presented in Chapter 7 of U.S. EPA (1989).

34. Deficiency/Recommendation: Section 5.3.11.2, p. WP-191

Numerical models are proposed for predicting the fate and transport of contaminants. It has been agreed in past unit managers' meetings that a standard set of models will be used in all operable units for simulating solute transport in the vadose and saturated zones, and that these models (VAM-2D, UNSAT-H, and PORFLO-3) will be supported by the Westinghouse Performance Assessment Group. The specific models proposed for the 100-NR-3 operable unit should be explicitly stated in Section 5.3.11.2 and in other appropriate sections of the work plan.

35. Deficiency/Recommendation: Section 5.5.13, p. WP-213, second paragraph

The text states, "The Phase II assessment differs from the baseline assessment in that actual exposure levels will be developed using state-of-the-art modeling techniques." This statement is confusing and should be changed since often baseline risk assessments also use modeling techniques to provide actual exposure levels.

36. Deficiency: Section 5.5.13, p. WP-214, fourth paragraph

The text states, "If the assessment shows that risks are posed then it will be used to support remedial action alternatives." It would be clearer to use the descriptive phrase from the first sentence of this paragraph ("little or no threat to human health or the environment") because even if risks are posed, they may not be a threat to human health or the environment.

Recommendation:

The sentence should be reworded to address threats to human health or the environment rather than "risks posed."

37. Deficiency/Recommendation: Section 5.8, p. WP-221

Section 5.8 indicates that "the RFI/CMS will provide the information necessary to prepare the closure plan" for the 120-N-1 and 116-N-2 disposal facilities. However, Section 5.3.2.3.2.8, p. WP-173, indicates that no source sampling is planned for 120-N-1 and 120-N-2 in this work plan, and that soil sampling activities for these units are associated with closure activities. These two statement seem to contradict each other. It appears that closure plan will provide the information necessary for the RFI/CMS, not the other way around as stated in Section 5.8.

SAMPLING AND ANALYSIS PLAN

Field Sampling Plan

38. Deficiency/Recommendation: Section 2.1.1., SAP/FSP-3

The 100-N Area coordinates are noted to constitute the primary reference grid for the geodetic and radiological vertification surveys. We assume that this information will go into HEIS and recommend that the grid be put in metric coordinates compatible with HEIS standards. It is our understanding that the old area specific and Hanford Site coordinate systems are being abandoned for RI/FS and RFI/CMS work, and that all future mapping will be done in Washington State Standard Lambert metric coordinates. Also, as noted in Comments to Section 5.3.2.2.1.1, the topographic mapping should show elevation contours at 1/2 meter intervals so that the maps can be digitized and entered into HEIS.

39. Deficiency: Section 2.1.1.2.1, p. SAP/FSP-4, first paragraph

It is unclear where the background plot is located or how it was selected.

Recommendation:

Rationale should be provided for selecting the location of the background surface radiation plot.

40. Deficiency/Recommendation: Section 2.1.2, p. SAP/FSP-5

Geophysical surveys are noted to further define the vertical and horizontal extent of soil contamination surrounding and below hazardous waste disposal facilities. The discussion of the proposed geophysical techniques -- EMI, MAG, and GPR -- indicate that these techniques will be used to identify the presence of buried hazardous waste disposal facilities, but give no indication of how the techniques will be used to determine "the vertical and horizontal extent of soil contamination" surrounding and below these facilities. Either revise the intended purpose of these investigations or give further information as to how these techniques will be used to determine the extent of contamination.

41. Deficiency: Section 2.1.3.1, p. SAP/FSP-7, fifth paragraph

The text states that soil gas probes will be installed to a depth of about 3 to 6 feet at all locations. This depth may not be proper for areas with compacted backfill exceeding 6 feet in depth.

Recommendation:

A sentence should be inserted stating that in areas known to contain compacted backfill, probes will be installed below the backfill.

42. Deficiency/Recommendation: Section 3.0, p. SAP/FSP-21

It is stated in Section 3.0 that "Geologic investigations are not within the scope of work for the 100-NR-3 work plan." However, in Section 5.3.3 a geologic investigation comprised of data compilation and field mapping is described. Update Section 3.0 of the Sampling and Analysis Plan to include a discussion of the 100-NR-3 Geologic Investigation.

43. Deficiency/Recommendation: Section 8.0, p. SAP/FSP-30, first paragraph

The text states that the ecological investigation will be supplemented by a "focused, on-site walkover." The focus of the walkover is unclear and should be defined.

Quality Assurance Project Plan

44. Deficiency/Recommendation: Section 2.1, p. SAP/QAPP-5, second paragraph

The organizational charts mentioned in this section and found in the project management plan are incomplete. The charts should include the names of the individual personnel involved with this operable unit.

45. Deficiency/Recommendation: Section 2.2, p. SAP/QAPP-5, fourth paragraph

The text states that "samples with activity greater than or equal to those derived from DOE Order 5480.11, Radiation Protection for Occupational Workers (DOE, 1988) will be routed to a Westinghouse Hanford or another Hanford site participant contractor laboratory." This statement should explicitly specify the levels of radioactivity established by DOE.

46. Deficiency/Recommendation: Section 3.0, p. SAP/QAPP-6, third paragraph

According to the text, the level of radioactivity found in the samples during the screening process will determine whether or not analyses will be performed on-site or off-site. The text should specify the level of radioactivity that will serve as the criterion for making the decision to analyze these samples on- or off-site.

47. Deficiency: Section 3.0, Table QAPP-1, p. SAP/QAPP-7

The reference methods, minimum detectable concentrations (MDCs) in soil, and method detection limits (MDLs) for radionuclides are incomplete. Simply listing "Westinghouse" in these columns is not sufficient.

Recommendation:

Specific EPA-approved methods, MDCs, and MDLs for the radionuclides should be listed. If established EPA methods do not exist for these species, then special analytical service (SAS) methods should be proposed.

48. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-8

MDC values for lead and total cyanide are reported as 1 mg/kg and 500 mg/kg respectively. These values are incorrect and should be changed to 0.6 mg/kg for lead and 2 mg/kg for total cyanide. In addition, the MDL for lead reported as 5 $\mu$g/L should be changed to 3 $\mu$g/L.

The detection methods and MDC for zirconium are reported as "Westinghouse." This is an insufficient reference. An established EPA method and MDC should be proposed. If no established method exists, then a SAS method should be proposed.

49. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-8-10

The units for MDC values are not correct. The units for MDC should be expressed as either µg/kg or mg/kg.

50. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-9

Both the MDC and MDL values for 2-hexanone are reported as 50µg/L. These values are incorrect and should be changed to 10µg/kg and 10µg/L, respectively.

51. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-10

The MDC and MDL quantitation limits of 10 µg/kg and 10µg/L, respectively should be included for bromomethane.

52. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-12

The pesticide MDC values listed in this table are reported as µg/L and should be changed to either µg/kg or mg/kg.

53. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-12

Where contract laboratory program (CLP) methods are cited for the pesticides, the superscript keyed to the definition of the acronym is missing and should be added.

54. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-13

The pesticides 2,4,5-TP (Silvex) and 2,4-D are not on the CLP list. Therefore, it is not correct to reference CLP methods for these species, and other EPA-approved methods should be referenced for these species. If approved EPA methods do not exist, then SAS methods should be used.

55. Deficiency/Recommendation: Section 3.0, Table QAPP-1, p. SAP/QAPP-14

The acronym ASTM in superscript f should be defined.

56. Deficiency/Recommendation: Section 3.0, p. SAP/QAPP-15, first paragraph

For Level IV, the text states that "full CLP analytical methods and protocols will be used on approximately 20% of the samples." Instead, full CLP analytical methods and protocols should be used on 100 percent of the Level IV samples.

57. Deficiency: Section 3.0, p. SAP/QAPP-16, first paragraph

The text states that "after individual laboratory SOWs are negotiated and procedures are developed and approved, Table QAPP-1 and this section will be revised to reference approved detection limits, precision, and accuracy criteria as project requirements." These items should be researched prior to the quality assurance project plan (QAPP) approval.

Some of the analytical parameters may require SAS methods. By establishing analytical methods, detection limits and accuracy and precision criteria prior to QAPP approval, data discrepancies may be avoided later.

Recommendation:

Analytical methods and criteria should be specified in the text and Table QAPP-1.

58. Deficiency/Recommendation: Section 3.0, p. SAP/QAPP-16, second paragraph

The corrective action mentioned in this paragraph should be defined and presented in detail.

59. Deficiency: Section 4.2.1, p. SAP/QAPP-17

This section mentions soil sampling procedures but makes no mention of water sampling procedures.

Recommendation:

A discussion of water sampling procedures should be included in this section, addressing sampling site selection criteria; sample numbers, types, and locations; and other site-specific considerations. Information pertaining to sampling preparation methods, sampling equipment, and sample storage and transportation should be included.

60. Deficiency/Recommendation: Section 4.2.2, Table QAPP-3, p. SAP/QAPP-22

In this table, all target analyte list (TAL) parameters are listed under one general heading. This is not appropriate and should be corrected because mercury and hexavalent chromium do not follow these general guidelines.

In addition, the listed holding time of 6 months is incorrect for several of these compounds.

Also, parameters such as radionuclides, sulfamate, and oxalate, whose requirements are referred to as "Westinghouse," should be researched to determine sample container and preservation requirements. If standard EPA methods are not available, then SAS methods should be established.

61. Deficiency/Recommendation: Section 4.2.2, Table QAPP-4, p. SAP/QAPP-23

Mercury should not be listed under the TAL heading because it does not follow general TAL parameters.

62. Deficiency/Recommendation: Section 5.0, p. 18, first paragraph

This section on sample custody is not complete. The text should include more detailed information concerning documentation of preparation methods and personnel responsibilities related to sampling, analysis, and laboratory custody. Documentation of the transportation of samples should also be included in this section. A statement should be included to clarify where the samples will be maintained. Copies of sample custody strips, chain-of-custody forms, and sample labels should be included as well.

63. Deficiency/Recommendation: Section 8.1, p. SAP/QAPP-26

This section should describe the data reporting scheme from start to finish, including data reduction, validation, and reporting. A flowchart describing the data reporting scheme is a recommended format for presenting this information.

Additionally, this section should describe the action to be taken if quality assurance criteria are not met and methods of handling data outliers.

64. Deficiency/Recommendation: Section 9.0, p. SAP/QAPP-29

The parameters for which the field blanks, equipment blanks, and trip blanks will be analyzed should be listed and the preservation reagents to be used for equipment blanks and trip blanks (if any) should be specified.

65. Deficiency/Recommendation: Section 9.0, p. SAP/QAPP-31, second paragraph

Internal quality control checks, matrix spike duplicates, laboratory blanks, surrogate spikes, and internal standards, should be included in this section.

66. Deficiency/Recommendation: Section 12.0, p. SAP/QAPP-34, second bullet

The standard EPA formula for calculating the MDL should be used (U.S. EPA, 1987).

67. Deficiency/Recommendation: Section 12.0, p. SAP/QAPP-34

A subsection addressing completeness, including the formula for calculating completeness, should be included in this section.

## MISCELLANEOUS COMMENTS

Deficiency/Recommendation: Section 5/8, p. WP-221

The 1324-N disposal facility has the designation number of 116-N-2 and 120-N-2 elsewhere.

**Deficiency/Recommendation:** Tables 6, 7, 8, and 9, pp. WP-99, 100, 101, and 102

The significant figures of the summary statistics in these tables are carried far beyond the accuracy and precision of the original analyses. The summary statistics should be carried to only 3 signficant figures.

## REFERENCES


U.S. EPA, 1989, Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A. U.S. Environmental Protection Agency, EPA/540/1-89/002, December 1989.

U.S. EPA 1987, Preparation Aid for HWERL's Category I Quality Assurance Project Plans. U.S. Environmental Protection Agency, Office of Research and Development, Hazardous Waste Engineering Laboratory, Cincinnati, OH, QAPP-0007-GFS, June, 1987.

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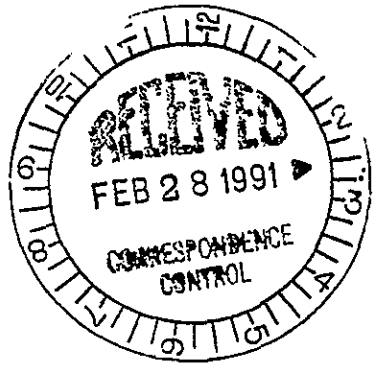


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